

Unit 16

Day 4

Properties of Logarithms

PROPERTIES OF LOGARITHMS

If x and y are any positive real numbers, r is any real number, and a is any positive real number, $a \neq 1$, then the following properties are true.

a) $\log_a xy = \log_a x + \log_a y$

b) $\log_a \frac{x}{y} = \log_a x - \log_a y$

c) $\log_a x^r = r \log_a x$

d) $\log_a a = 1$

e) $\log_a 1 = 0$

Write each expression as a sum, difference, or product of logarithms. Simplify if possible. Assume that all variables represent positive real numbers.

1)

$$\log_2 4p^3$$
$$\log_2 4 + \log_2 p^3$$
$$\boxed{2 + 3\log_2 p}$$

2)

$$\log_4 \frac{3m}{m+2}$$
$$\log_4 3m - \log_4 (m+2)$$
$$\log_4 3 + \log_4 m - \log_4 (m+2)$$

Write each expression as a sum, difference, or product of logarithms. Simplify if possible. Assume that all variables represent positive real numbers.

3) $\log_5 \frac{7m^3}{8y} =$

$$\log_5 7m^3 - \log_5 8y$$

$$\log_5 7 + \log_5 m^3 - (\log_5 8 + \log_5 y)$$

$$\log_5 7 + 3\log_5 m - \log_5 8 - \log_5 y$$